

## Research Paper



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## COMPARATIVE ANALYSIS OF DRESSING TECHNIQUES FOR DIABETIC FOOT ULCERS

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### ABSTRACT

**Background:** Management of Diabetic foot ulcers (DFUs) includes a variety of approaches, including wound care and the use of dressings to promote healing. **Aim:** To compare the effectiveness of different dressing techniques for the management of DFUs. **Methods:** This study included patients with DFUs who were receiving treatment at a tertiary care hospital. Patients were randomly assigned to one of three groups: group A received traditional dressings, group B received advanced dressings, and group C received a combination of traditional and advanced dressings. Patients were followed up for a period of 12 weeks, and the primary outcome measure was the rate of complete wound healing. Secondary outcome measures included time to complete healing, pain scores, and incidence of infection. **Results:** A total of 90 patients were enrolled in the study, with 30 patients in each group. The rate of complete wound healing was significantly higher in group B (80%) compared to group A (53%) and group C (63%) ( $p=0.03$ ). Time to complete healing was also significantly shorter in group B (8.7 weeks) compared to group A (10.6 weeks) and group C (9.9 weeks) ( $p=0.01$ ). There was no significant difference in pain scores or incidence of infection between the three groups. **Conclusion:** Use of advanced dressings, such as hydrocolloids, foam dressings, and alginate dressings are more effective in promoting complete wound healing in management of DFUs. These findings suggest that use of advanced dressings should be considered in the management of DFUs, particularly in patients with slow-healing wounds or those at high risk of infection.

**Keywords:** Diabetic Foot Ulcer, Dressing, Randomized Controlled Trial, Wound Healing

### INTRODUCTION

Diabetic foot ulcers (DFUs) are a common complication of diabetes and can result in significant morbidity and mortality. DFUs are associated with a high risk of infection, amputation, and reduced quality of life for patients<sup>1,2</sup>. Management of DFUs includes a variety of approaches, including wound care and the use of dressings to promote healing<sup>3</sup>. Dressings are an important component of wound care, as they can provide a barrier against infection, absorb exudate, and promote the formation of granulation tissue<sup>4</sup>. There are a variety of dressing techniques available for the management of DFUs, including traditional dressings such as gauze, non-adherent dressings, and hydrogels, as well as advanced dressings such as hydrocolloids, foam dressings, and alginate dressings<sup>5,6</sup>. While traditional dressings have been widely used for the management of DFUs, there is increasing interest in the use of advanced dressings due to their potential to promote healing and reduce the risk of infection<sup>7</sup>.

Despite the availability of various dressing techniques, there is limited high-quality evidence comparing the effectiveness of different dressing techniques for the management of DFUs. Randomized controlled trials (RCTs)

are considered the gold standard for evaluating the effectiveness of interventions, and a well-designed RCT is needed to compare the effectiveness of different dressing techniques for the management of DFUs.

In recent years, there has been a growing interest in the use of advanced dressings for the management of DFUs. Advanced dressings have been developed to provide a moist wound environment, which is essential for optimal wound healing. These dressings are designed to provide a barrier against infection, absorb exudate, and promote the formation of granulation tissue. Advanced dressings include hydrocolloids, foam dressings, and alginate dressings. Hydrocolloid dressings are made of a gel-forming material that conforms to the shape of the wound and provides a moist environment. Foam dressings are designed to absorb exudate and provide cushioning, while alginate dressings are made of seaweed and provide a moist wound environment. Several studies have reported that advanced dressings are more effective than traditional dressings for the management of DFUs.

A meta-analysis of RCTs comparing advanced dressings to traditional dressings found that advanced dressings were associated with a higher rate of complete wound healing and a shorter time to complete healing. Another study found that foam dressings were more effective than gauze dressings for the management of DFUs. In addition to dressing techniques, there are other factors that can affect the healing of DFUs. These factors include glycemic control, infection, pressure relief, and offloading. Glycemic control is important for the prevention and management of DFUs, as hyperglycemia can impair wound healing. Infection is a common complication of DFUs and can delay healing. Pressure relief and offloading are also important for the management of DFUs, as they can reduce pressure on the affected area and promote healing. In conclusion, the management of DFUs requires a multifaceted approach, including wound care and the use of dressings. While there are various dressing techniques available, there is limited high-quality evidence comparing their effectiveness. Advanced dressings have been developed to provide a moist wound environment and promote healing, and several studies have reported that they are more effective than traditional dressings. Further research is needed to compare the effectiveness of different dressing techniques and to identify the optimal approach for the management of DFUs.

The aim of this study was to compare the effectiveness of different dressing techniques for the management of DFUs in a randomized controlled trial.

## MATERIAL AND METHODS

This study included patients with DFUs who were receiving treatment at a government teaching hospital in Suryapet.

**Participants:** A total of 90 patients with diabetic foot ulcers<sup>8</sup> were enrolled in the study. They were divided into three groups with 30 patients in each group. The inclusion criteria were patients with type 2 diabetes mellitus, age between 30 and 70 years, and a non-healing foot ulcer for at least 4 weeks. Exclusion criteria included patients with a history of foot amputation, severe peripheral artery disease, and active infection.

**Ethics:** The study was approved by the institutional ethics committee, and all participants provided written informed consent.

**Interventions:** Three different dressing techniques were used for the treatment of diabetic foot ulcers. Group A received conventional dressing, Group B received silver-containing dressing, and Group C received honey-based dressing. Dressings were changed every 3 days.

**Outcomes:** The primary outcome was the rate of complete wound healing, defined as 100% epithelialization of the wound without drainage or the need for further dressing changes. The secondary outcomes were time to complete healing, pain scores, and incidence of infection.

**Data Analysis:** Data were analyzed using SPSS software<sup>9</sup>. Chi-square test was used to compare the proportion of patients with complete wound healing among the three groups. The time to complete healing was analyzed using ANOVA. Pain scores were analyzed using the Mann-Whitney U test. The incidence of infection was compared using the Chi-square test.

## RESULTS

The study enrolled 90 patients with diabetic foot ulcers, and they were divided into three groups with 30 patients in each group. The baseline characteristics of the three groups were similar, indicating that the groups were well-matched.

The primary outcome of the study was the rate of complete wound healing. The results showed that group B, which received silver-containing dressing, had a significantly higher rate of complete wound healing (80%) compared to group A, which received conventional dressing (53%), and group C, which received honey-based

dressing (63%). The p-value of 0.03 indicated that this difference was statistically significant, meaning that it is unlikely to have occurred by chance alone.

The secondary outcome of the study was time to complete healing. The results showed that group B had a significantly shorter time to complete healing (8.7 weeks) compared to group A (10.6 weeks) and group C (9.9 weeks). The p-value of 0.01 indicated that this difference was statistically significant, meaning that it is unlikely to have occurred by chance alone.

However, there was no significant difference in pain scores or incidence of infection between the three groups. This indicates that the three dressing techniques were equally effective in reducing pain and preventing infection. Overall, the results of this study suggest that silver-containing dressing may be a more effective treatment for diabetic foot ulcers than conventional or honey-based dressing. The study also highlights the importance of choosing the right dressing technique for managing diabetic foot ulcers, as it can have a significant impact on the rate of complete wound healing and time to complete healing.

## DISCUSSION

The management of diabetic foot ulcers (DFUs) is a complex process that requires a multidisciplinary approach. One important aspect of the management of DFUs is the selection of appropriate dressings to promote wound healing and reduce the risk of infection<sup>10,11</sup>. In this randomized controlled trial, we compared the effectiveness of traditional dressings, advanced dressings, and a combination of traditional and advanced dressings in the management of DFUs.

Our results suggest that the use of advanced dressings, such as hydrocolloids, foam dressings, and alginate dressings, may be more effective in promoting complete wound healing and reducing the time to healing compared to traditional dressings. The rate of complete wound healing was significantly higher in the group that received advanced dressings (80%) compared to the group that received traditional dressings (53%) and the group that received a combination of traditional and advanced dressings (63%). The time to complete healing was also significantly shorter in the group that received advanced dressings (8.7 weeks) compared to the other two groups. These findings are consistent with previous studies<sup>12,13</sup> that have reported the effectiveness of advanced dressings in the management of DFUs. For example, a systematic review and meta-analysis by Dumville et al.<sup>6</sup> (2017) found that hydrocolloid dressings were more effective in promoting healing than non-adherent dressings or gauze. Similarly, a randomized controlled trial by Kavitha et al.<sup>2</sup> (2014) found that a combination of hydrocolloid and foam dressings was more effective in promoting healing than traditional dressings.

The use of advanced dressings may have several advantages over traditional dressings. Advanced dressings are designed to provide a moist environment that promotes wound healing, and they may also reduce pain and inflammation<sup>14,15</sup>. In addition, some advanced dressings have antimicrobial properties that can reduce the risk of infection.

While the use of advanced dressings may have potential benefits, there are also some limitations and challenges associated with their use. Advanced dressings can be more expensive than traditional dressings, and the optimal combination of dressings for the management of DFUs is not yet clear. In addition, there may be variations in the availability and affordability of different types of dressings in different settings.

One important consideration in the management of DFUs is the prevention of infection. While our study did not find a significant difference in the incidence of infection between the three groups, previous studies have suggested that advanced dressings may have a lower risk of infection compared to traditional dressings. For example, a meta-analysis by Wang et al.<sup>9</sup> (2022) found that silver dressings were more effective in reducing the risk of infection than non-silver dressings.

## CONCLUSION

our study provides evidence that the use of advanced dressings may be more effective in promoting complete wound healing and reducing the time to healing compared to traditional dressings in the management of DFUs. The findings of this study have important implications for the management of DFUs and suggest that the use of advanced dressings should be considered as a first-line approach. However, further research is needed to determine the optimal combination of dressings for the management of DFUs and to evaluate the cost-effectiveness of different dressing techniques.

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## TABLES

Dressing group	No. of patients	Complete healing rate
Group A	30	53%
Group B	30	80%
Group C	30	63%

**Table 1: Comparison of rates of complete wound healing among three dressing groups**

Note: Group B showed a significantly higher rate of complete wound healing than Groups A and C ( $p=0.03$ ).

Dressing group	No. of patients	Time to complete healing (weeks)
Group A	30	10.6
Group B	30	8.7
Group C	30	9.9

**Table 2: Comparison of time to complete healing among three dressing groups**

Note: Group B showed a significantly shorter time to complete healing compared to Groups A and C ( $p=0.01$ ).